

**JOURNAL OF
PLASMA PHYSICS**

JOURNAL OF PLASMA PHYSICS exists for the publication of experimental and theoretical research papers on plasma physics and its applications.

EDITOR

DR J. P. DOUGHERTY

*Department of Applied Mathematics and Theoretical Physics, University of Cambridge,
Silver Street, Cambridge, England*

ASSOCIATE EDITORS

PROF. D. BERSHADER

*Department of Aeronautics and Astronautics,
Stanford University, Stanford, California 94305, U.S.A.*

PROF. F. D. KAHN

*Department of Astronomy,
University of Manchester, Manchester 13, England*

PROF. W. B. THOMPSON

*Department of Physics,
University of California, La Jolla, California 92038, U.S.A.*

Authors wishing to have papers published in the JOURNAL should communicate them to any one of the persons named above, choosing one in their own country where possible.

Authors are urged to ensure that their papers are written clearly and attractively, in order that their work will be readily accessible to readers.

Manuscripts should be typed in double spacing on one side of the paper only, with references listed at the end in alphabetical order of authors. Drawings should be done in Indian ink on plain white or transparent paper, and should not be larger than 15 in. by 24 in. Lettering should be shown clearly in pencil for reproduction by the printer, and as far as possible information relating to a figure should be placed in the caption rather than on the figure. A typed list of captions should be provided at the end of the manuscript. Proofs of papers from overseas will usually be despatched to authors by airmail. There is no charge for publication. Authors are entitled to receive 50 offprints of a paper in the JOURNAL free of charge, and additional offprints can be purchased if ordered in advance.

JOURNAL OF PLASMA PHYSICS is published once every two months in January, March, May, July, September and November, by Cambridge University Press P.O. Box 92, London NW1 2DB and 32 East 57th Street, New York, N.Y. 10022.

Three parts form a volume. The subscription price of a volume (which includes postage) is £12 net (\$37.50 in the U.S.A.). Single parts cost £5 net (\$15.50 in the U.S.A.) plus postage.

Copies of the journal for subscribers in the United States of America are sent by air to New York to arrive with minimum delay.

Second class postage paid at New York, N.Y.

JOURNAL OF PLASMA PHYSICS

VOLUME 6
1971

CAMBRIDGE
AT THE UNIVERSITY PRESS
1971

PUBLISHED BY
THE SYNDICS OF THE CAMBRIDGE UNIVERSITY PRESS

Bentley House, 200 Euston Road, London NW1 2DB
American Branch: 32 East 57th Street, New York, N.Y. 10022

Printed in Great Britain at the University Printing House, Cambridge

CONTENTS TO VOLUME 6

PART 1 AUGUST 1971

Analysis of electromagnetic instabilities parallel to the magnetic field. <i>page 1</i> W. PILIPP and H. J. VÖLK	
Transonic plasma flow past an obstacle. P. C. STANGEBY and J. E. ALLEN	19
Radiation from charged particles in weakly inhomogeneous magnetic fields. DAVID M. COOK	33
Lagrangian approach to non-linear wave interactions in a warm plasma. J. J. GALLOWAY and H. KIM	53
Resistive instability in a uniformly rotating magnetoplasma. A. D. LUNN	73
Finite-Larmor-radius equations for collisionless plasmas in general magnetic fields. E. BOWERS	87
Collision integral between particles of disparate mass. C. LO SURDO	107
On the equations for non-linear wave solutions of the Vlasov and Poisson equations. R. J. GRIBBEN	119
Ideally conducting magnetostatic equilibria and associated time dependent, resistive flows. JOHN C. STEVENSON	125
The expansion of a plasma from a spherical source into a vacuum. Part 1. Fully-ionized flow. JUDITH GOLDFINCH and D. C. PACK	137
The expansion of a plasma from a spherical source into a vacuum. Part 2. Partially-ionized flow. JUDITH GOLDFINCH	153
Stability of a plasma stream in a magnetic field. A. LAMONT, J. C. TAYLOR and E. W. LAING	169
Electrostatic oscillations in cold inhomogeneous plasma. Part 2. Integral equation approach. Z. SEDLÁČEK	187
The effect of impurity ions on the stability of drift waves. R. S. B. ONG and M. Y. YU	201
Construction of electron distribution functions from laser scattering spectra. J. H. WILLIAMSON and M. E. CLARKE	211
A note on the formation of Debye potential well in current-carrying plasmas. J. R. KAN	223
Electrostatic shielding of a test charge in a non-neutral plasma. R. C. DAVIDSON	229

PART 2 OCTOBER 1971

Stability of anisotropic plasma jet. M. R. RAGHAVACHAR	page 237
Adiabatic transverse waves in a conducting gas. B. ROBERTS and C. SOZOU	249
Identities between reflection and transmission coefficients and electric field components for certain anisotropic modes of oblique propagation. J. HEADING	257
A singular perturbation analysis of theoretical models for warm inhomogeneous plasmas. R. M. MIURA and E. M. BARSTON	271
Magnetogasdynamic shock polar for aligned fields. Y. M. LYNN	283
Wave-particle interactions in electrostatic waves in an inhomogeneous medium. D. NUNN	291
Propagation of Alfvén waves in ion-sound turbulent plasma. A. REGISTER	309
Non-linear interaction of electrostatic monochromatic waves in a magnetoplasma. J. A. TATARONIS and J. TEICHMANN	325
On some similarity solutions in magnetohydrodynamics. C. SOZOU	331
Thermal and collisional corrections to the ordinary wave. F. N. ARUMI and M. E. OAKES	343
Electrostatic waves in periodic inhomogeneous plasma. P. BERTRAND, M. R. FEIX and G. BAUMANN	351
Cyclotron radiation in hot magnetoplasmas. J. TRULSEN	367
Non-linear theory of hydromagnetic waves in a high β plasma. M. DOBROWOLNY and A. REGISTER	401
E-layer precession in a plasma. H. L. BERK and R. N. SUDAN	413
Kinetic theory of a two-dimensional magnetized plasma. G. VAHALA and D. MONTGOMERY	425
REVIEW	
<i>Reviews of Plasma Physics, by M. A. Leontovich</i>	441

PART 3 DECEMBER 1971

Electron heating in a perpendicular collisionless shock. R. A. CAIRNS	443
Whistler instability in plasmas with anisotropic and non-Maxwellian velocity distributions. K. F. LEE	449
A Fokker-Planck treatment of non-linearly interacting waves. I. COOK	457
Existence conditions for collisionless hydromagnetic shock waves along the magnetic field. Y. KATO, M. TAJIRI and T. TANIUTI	467

Stability of anisotropic plasmas to almost-perpendicular magnetosonic waves. R. W. LANDAU and S. CUPERMAN	page 495
Quasi-wave trains in a cold collisionless plasma. Y. INOUE	513
Collisional drift waves in the presence of coherent ion acoustic or Langmuir waves. M. DOBROWOLNY and P. NEGRINI	527
Higher branches of the dispersion relation for perpendicular magnetosonic waves in relativistic anisotropic plasmas. S. CUPERMAN and N. METZLER	541
Mass and heat transfer in a diatomic gas. J. C. HAAS, V. S. ARPACI and G. S. SPRINGER	547
Longitudinal waves in a perpendicular collisionless plasma shock. Part 3. $T_e \sim T_i$. S. P. GARY	561
Plasma models of the topside ionosphere and electrostatic wave propagation. M. T. C. FANG and M. K. ANDREWS	567
The propagation of plasma waves near multiples of the electron gyrofrequency. M. K. ANDREWS and M. T. C. FANG	579
Electron pitch-angle diffusion driven by oblique whistler-mode turbulence. L. R. LYONS, R. M. THORNE and C. F. KENNEL	589
Magneto-acoustic resonance in a non-uniform current carrying plasma column. J. VACLAVIK	607
Generalised theory of the stability of shock waves in magnetogas-dynamics. L. C. WOODS	615
INDEX TO VOLUME 6	628

